

Foundations of Modern Networking

SDN, NFV, QoE, IoT, and Cloud

By: William Stallings

Chapter 3

SDN: Background and Motivation

Industry Consortia

- By far, the most important consortium involved in SDN standardization is the Open Networking Foundation (ONF)
 - ONF is an industry consortium dedicated to the promotion and adoption of SDN through open standards development
 - Most important contribution to date is the OpenFlow protocol and API
 - OpenFlow protocol is the first standard interface specifically designed for SDN
 - Enables networks to evolve by giving logically centralized control software the power to modify the behavior of network devices through a well-defined “forwarding instruction set”
- Open Data Center Alliance (ODCA) is a consortium of leading global IT organizations dedicated to accelerating adoption of interoperable solutions and services for cloud computing
 - Defining requirements for SDN and NFV cloud deployment through the development of usage models for SDN and NFV
- Alliance for Telecommunications Industry Solution (ATIS) is a membership organization that provides the tools necessary for the industry to identify standards, guidelines, and operating procedures that make the interoperability of existing and emerging telecommunications products and services possible

OpenDaylight

- An open source software activity under the auspices of the Linux foundation
- Its member companies provide resources to develop an SDN controller for a wide range of applications
- Is more in the nature of an open development initiative than a consortium
- Also supports network programmability via southbound protocols, a bunch of programmable network services, a collection of northbound APIs, and a set of applications

Open Platform for NFV (OPNFV)

- An open source project dedicated to accelerating the adoption of standardized NFV elements
- Will establish a carrier-grade, integrated, open source reference platform that industry peers will build together to advance the evolution of NFV and to ensure consistency, performance, and interoperability among multiple open source components
- Will work with upstream projects to coordinate continuous integration and testing while filling development gaps

OpenStack

- Is an open source software project that aims to produce an open source cloud operating system
- Provides multitenant Infrastructure as a Service (IaaS) and aims to meet the needs of public and private clouds regardless of size, by being simple to implement and massively scalable
- SDN technology is expected to contribute to its networking part, and to make the cloud operating system more efficient, flexible, and reliable



End of Chapter 3

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Chapter 4

SDN Data Plane and OpenFlow

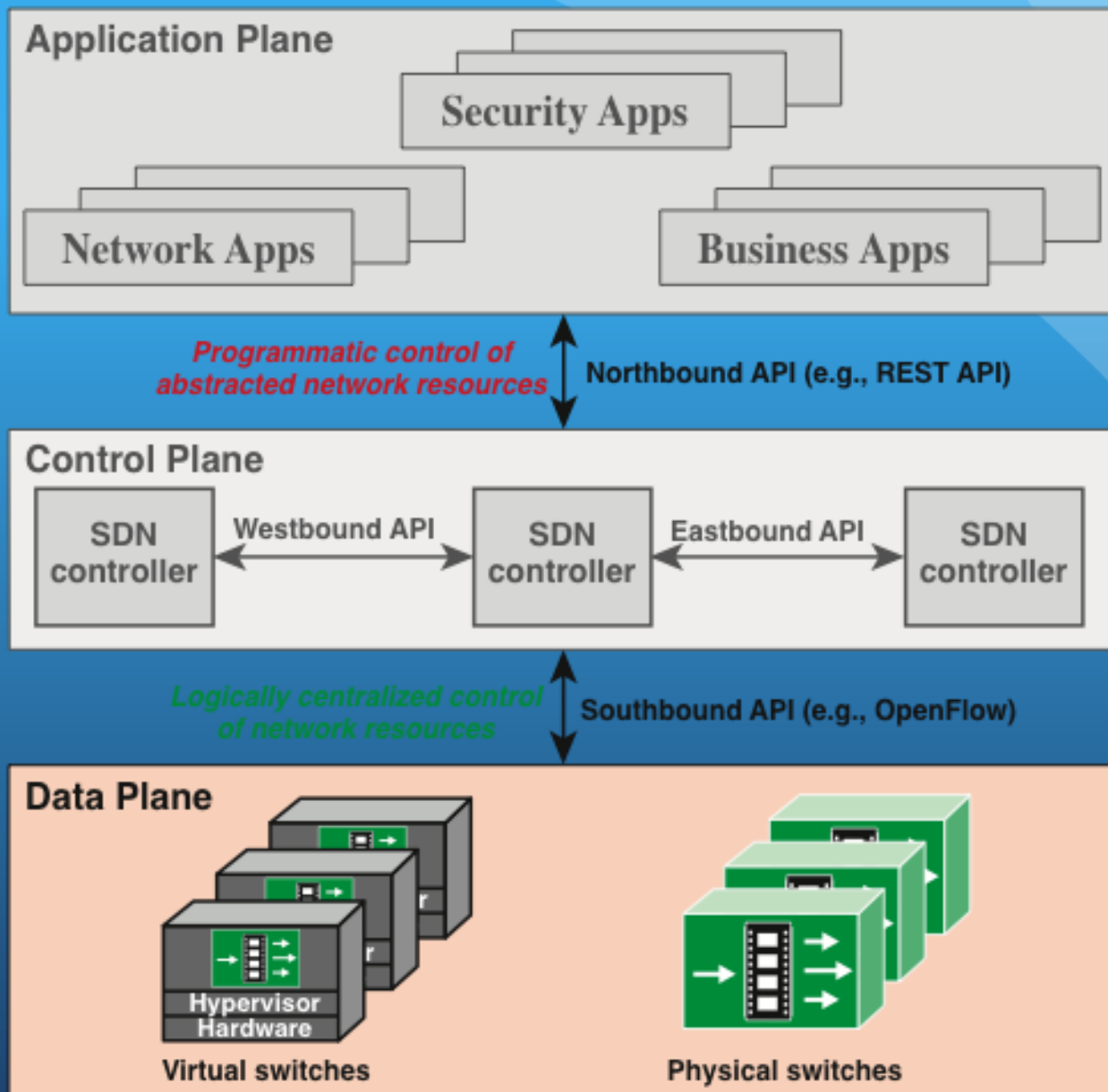


Figure 4.1 SDN Architecture

Control flows (e.g., OpenFlow PDUs:
OpenFlow/TLS/TCP/IP)

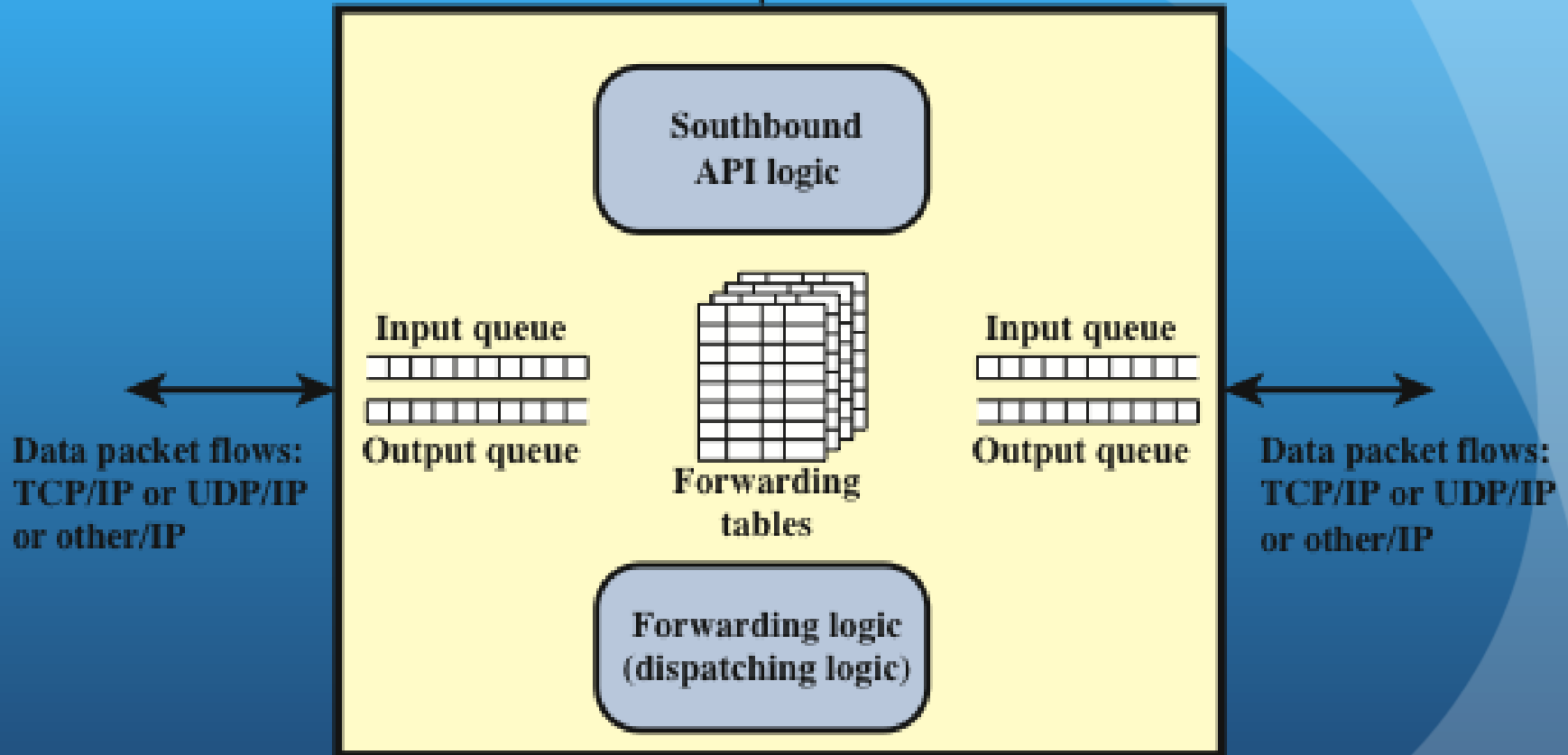


Figure 4.2 Data Plane Network Device

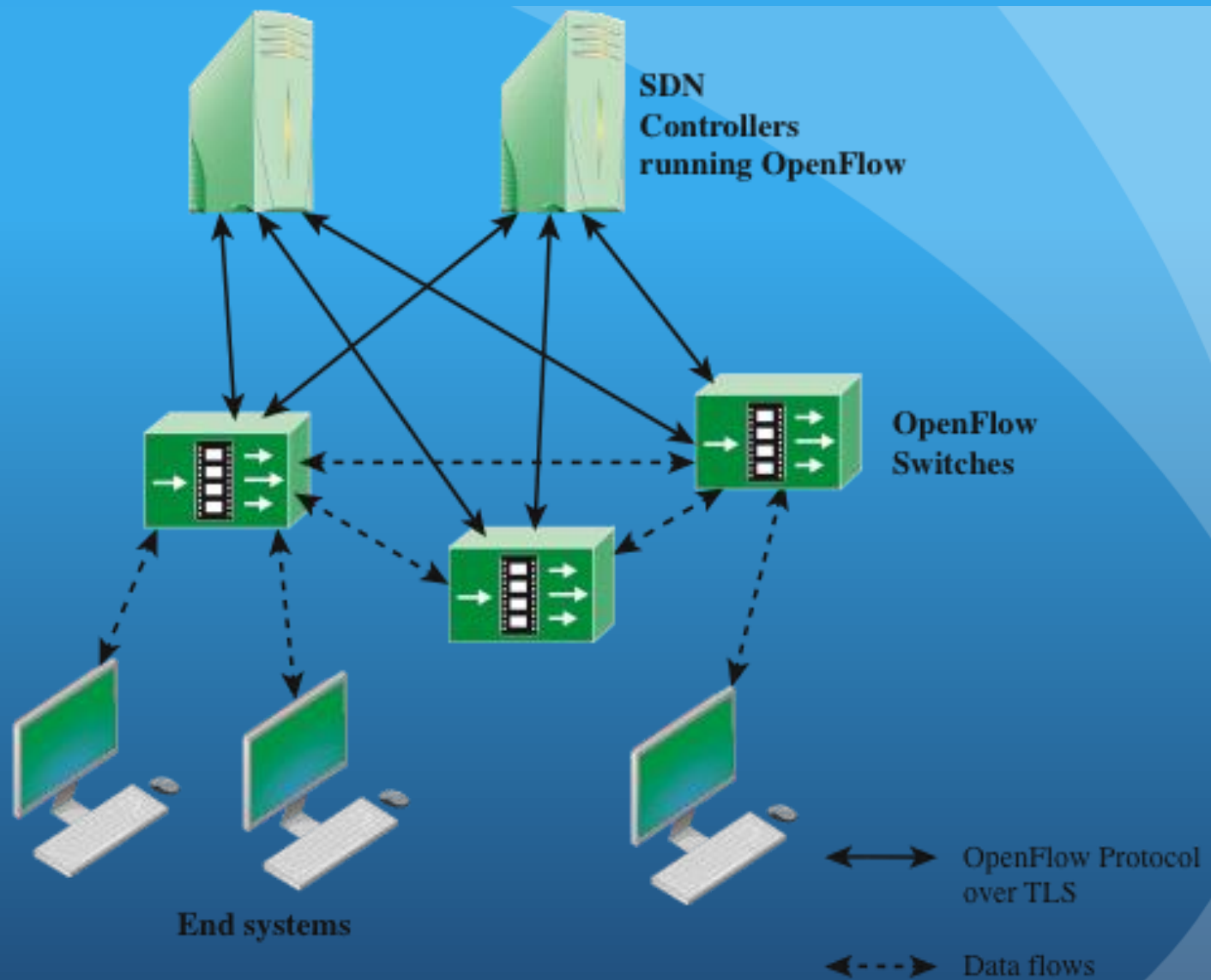


Figure 4.3 OpenFlow Switch Context

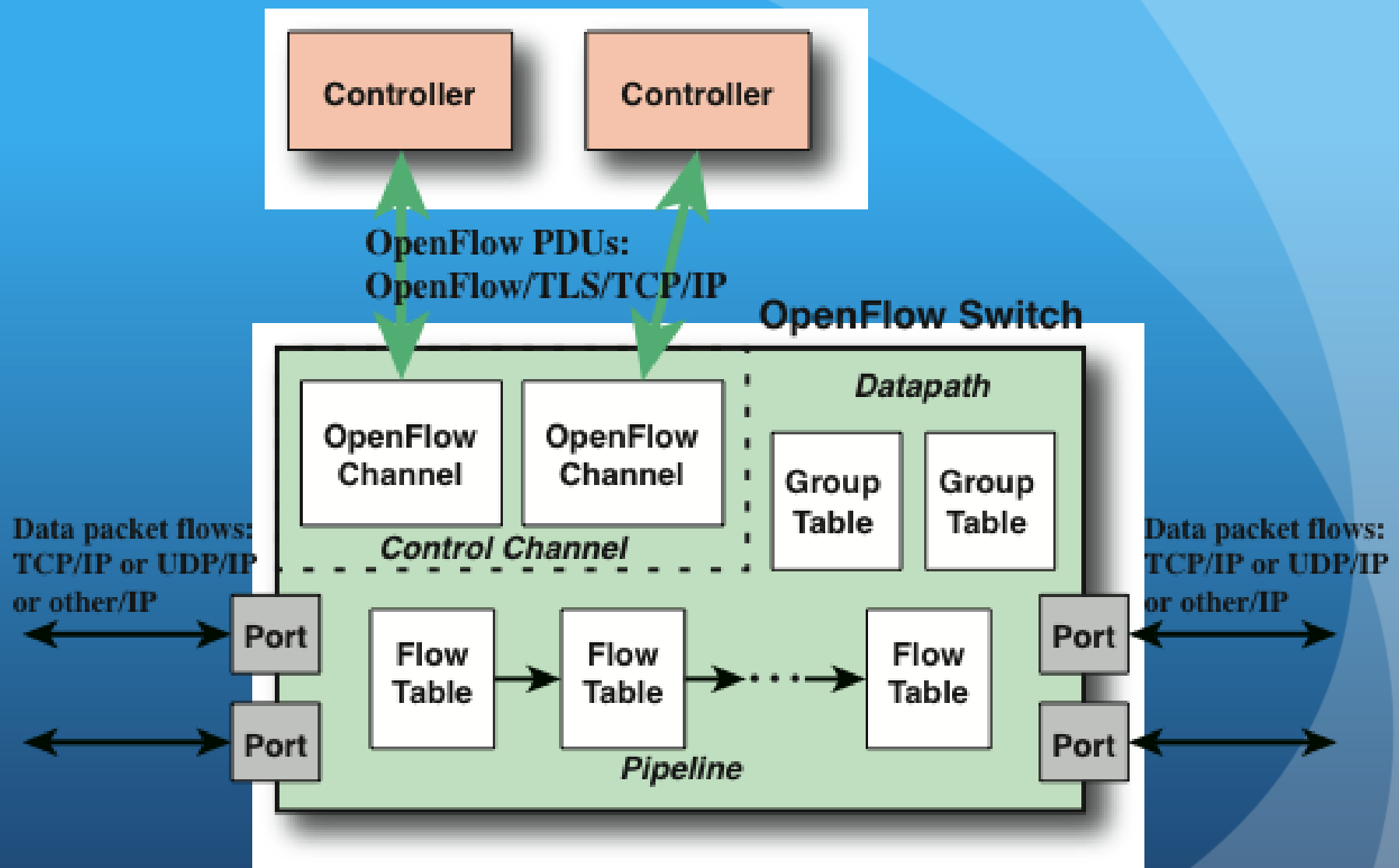


Figure 4.4 Main Components of an OpenFlow Switch

Match fields	Priority	Counters	Instructions	Timeouts	Cookie	Flags
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(a) Flow Table Entry Fields

Ingr port	Egr port	Ethr SA	Ethr DA	Ethr Type	IP prot	IPv4 SA	IPv4 DA	IPv6 SA	IPv6 DA	TCP Src	TCP Dest	UDP Src	UDP Dest
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(b) Flow Table Match Fields (required fields)

Group Identifier	Group Type	Counters	Action Buckets
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(c) Group Table Entry Fields

Figure 4.5 OpenFlow Table Entry Formats